

1 WHAT IS CLAIMED IS:

- 2 1. A catalyst having a macropore structure comprising zeolite Y wherein
3 the peak macropore diameter of the catalyst, measured by ASTM Test
4 No. D 4284-03, is less than about 2000 angstroms and the cumulative
5 pore volume of the catalyst at pore diameters less than or equal to about
6 500 angstroms, measured by ASTM Test No. D 4284-03, is less than or
7 equal to about 0.30 milliliters per gram.
8
- 9 2. The catalyst of claim 1 wherein the cumulative pore volume at pore
10 diameters less than or equal to about 400 angstroms is less than about
11 0.30 milliliters per gram.
12
- 13 3. The catalyst of claim 2 wherein the cumulative pore volume at pore
14 diameters less than or equal to about 300 angstroms is less than about
15 0.25 milliliters per gram.
16
- 17 4. The catalyst of claim 3 wherein the cumulative pore volume at pore
18 diameters less than or equal to about 300 angstroms is less than about
19 0.20 milliliters per gram.
20
- 21 5. The catalyst of claim 4 wherein the cumulative pore volume of the
22 catalyst at pore diameters less than or equal to about 400 angstroms is
23 in the range of about 0.05 milliliters per gram to about 0.18 milliliters per
24 gram.
25
- 26 6. The catalyst of claim 5 wherein the cumulative pore volume of the
27 catalyst at pore diameters less than or equal to about 300 angstroms is
28 in the range of about 0.08 milliliters per gram to about 0.16 milliliters per
29 gram.
30

- 1 7. The catalyst of claim 1 wherein the peak macropore diameter is in the
2 range of about 700 angstroms to about 1800 angstroms.
3
- 4 8. The catalyst of claim 7 wherein the peak macropore diameter is in the
5 range of about 750 angstroms to about 1600 angstroms.
6
- 7 9. The catalyst of claim 8 wherein the peak macropore diameter of the
8 catalyst is in the range of about 900 angstroms to about
9 1400 angstroms.
10
- 11 10. The catalyst of claim 1 wherein the zeolite Y has a silica to alumina ratio
12 of about 5:1 to about 100:1.
13
- 14 11. The catalyst of claim 10 wherein the zeolite Y has a silica to alumina
15 ratio of about 30:1 to about 80:1.
16
- 17 12. The catalyst of claim 11 wherein the zeolite Y has the silica to alumina
18 ratio of about 50:1 to about 70:1.
19
- 20 13. The catalyst of claim 1 wherein the catalyst is in the form of a tablet.
21
- 22 14. The catalyst of claim 13 wherein peak macropore diameter of the
23 catalyst is in the range of about 500 angstroms to about 1500 angstroms
24 and cumulative pore volume at pore diameters less than or equal to
25 about 500 angstroms is in the range of about 0.05 milliliters per gram to
26 about 0.15 milliliters per gram.
27
- 28 15. A catalyst composite comprising:
29
- 30 (a) the catalyst of claim 1; and
31
- 32 (b) a binder.

- 1 16. The catalyst composite of claim 15 wherein the binder is a suitable
2 inorganic material.
- 3 17. The catalyst composite of claim 16 wherein the binder is alumina.
- 4 18. The catalyst composite of claim 15 wherein the zeolite Y is present in
5 the range of about 40 weight percent to about 99 weight percent based
6 on the total dry weight of the catalyst composite.
- 7 19. The catalyst composite of claim 18 wherein the zeolite Y is present in
8 the range of about 50 weight percent to about 85 weight percent based
9 on the total dry weight of the catalyst composite.
- 10 20. A process for preparing a catalyst composite comprising:
11
- 12 (a) contacting a zeolite Y with a binder in the presence of volatiles to
13 form a mixture wherein the weight percent of zeolite Y is in the
14 range of about 40 to about 99 percent based on the total dry weight
15 of the resulting catalyst composite, and wherein the volatiles in the
16 mixture are in the range of about 30 weight percent to about
17 70 weight percent of the mixture;
18
- 19 (b) shaping the mixture to form a composite;
20
- 21 (c) drying the composite; and
22
- 23 (d) calcining the composite in a substantially dry environment.
24
- 25 21. The process of claim 20 wherein in step (b) shaping comprises
26 extruding.
- 27 22. The process of claim 20 wherein in step (a) the weight percent of
28 zeolite Y is in the range of about 50 to about 85.

- 1 23. The process of claim 20 wherein the binder in step (a) is a suitable
2 inorganic material.
- 3 24. The process of claim 23 wherein the binder is alumina.
- 4 25. The process of claim 20 wherein in step (a) the volatiles in the mixture
5 are present in the range of about 40 weight percent to about 60 weight
6 percent of the mixture.
- 7 26. The process of claim 25 wherein the volatiles comprise water and an
8 acid.
- 9
- 10 27. A catalyst composite prepared by the process of claim 20.
- 11
- 12 28. A process for preparing an alkylated aromatic composition comprising:
13
14 contacting at least one aromatic hydrocarbon with at least one olefin
15 under alkylation conditions in the presence of a catalyst having a
16 macropore structure comprising zeolite Y wherein the peak macropore
17 diameter, measured by ASTM Test No. D 4284-03, is less than about
18 2000 angstroms and the cumulative pore volume of the catalyst at pore
19 diameters less than or equal to about 500 angstroms, measured by
20 ASTM Test No. D 4284-03, is less than or equal to about 0.30 milliliters
21 per gram.
- 22
- 23 29. The process of claim 28 further comprising sulfonating the alkylated
24 aromatic composition to form an alkylated aromatic sulfonic acid.
- 25
- 26 30. The process of claim 29 further comprising reacting the alkylated
27 aromatic sulfonic acid with an alkaline earth metal and carbon dioxide to
28 produce a carbonated, overbased alkylated aromatic sulfonate.
- 29

- 1 31. A process for producing an alkylated aromatic composition comprising:
2
3 contacting at least one aromatic hydrocarbon with at least one olefin
4 under alkylation conditions in the presence of the catalyst composite of
5 claim 20.
6
- 7 32. The process of claim 31 wherein the aromatic hydrocarbon is benzene
8 or toluene.
9
- 10 33. The process of claim 31 wherein the olefin is an alpha olefin, an
11 isomerized olefin, a branched-chain olefin or mixtures thereof.
12
- 13 34. The process of claim 33 wherein the olefin has from about 4 carbon
14 atoms to about 80 carbon atoms.
15
- 16 35. The process of claim 33 wherein the alpha olefin or the isomerized olefin
17 have from about 6 carbon atoms to about 40 carbon atoms.
18
- 19 36. The process of claim 35 wherein alpha olefin or the isomerized olefin
20 have from about 20 carbon atoms to about 40 carbon atoms.
21
- 22 37. The process of claim 33 wherein the branched-chain olefin has from
23 about 6 carbon atoms to about 70 carbon atoms.
24
- 25 38. The process of claim 37 wherein the branched-chain olefin has from
26 about 8 carbon atoms to about 50 carbon atoms.
27
- 28 39. The process of claim 38 wherein the branched-chain olefin has from
29 about 12 carbon atoms to about 18 carbon atoms.
30

- 1 40. The process of claim 33 wherein the olefin is a partially-branched-chain
2 isomerized olefin wherein the olefin has from about 6 carbon atoms to
3 about 40 carbon atoms.
4
- 5 41. The process of claim 40 wherein the partially-branched-chain isomerized
6 olefin has from about 20 carbon atoms to about 40 carbon atoms.
7
- 8 42. The process of claim 31 further comprising sulfonating the alkylated
9 aromatic composition to form an alkylated aromatic sulfonic acid.
10
- 11 43. The process of claim 42 further comprising reacting the alkylated
12 aromatic sulfonic acid with an alkaline earth metal and carbon dioxide to
13 produce a carbonated, overbased alkylated aromatic sulfonate.